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I. MANAGEMENT SUMMARY

The purpose of this interim report is to summarize the results of our survey and documentation of present Navy internal control and auditing practices related to distributed systems and present our research findings on the impact of distributed systems on internal control.

The overall objective of this engagement is to assist the Navy in developing improved internal controls and EDP audit capability in the area of distributed systems and minicomputers. This management summary is designed to provide a concise explanation of this report's contents and organization.

1. ENGAGEMENT OBJECTIVES

The Office of Naval Research and the Navy Comptroller's Office are interested in researching management technology for the purpose of developing improved financial management in the Navy. One of the most significant trends in financial management systems is the development and use of minicomputers and distributed systems. The thrust of the project deals with research on the impact of developing EDP technology in this area on internal controls and auditing.

Specific objectives of this project include:

- Develop a computer audit checklist to enable the Navy to efficiently audit distributed systems

- Determine the impact of distributed systems on internal controls. Identify internal control practices and procedures compatible with this new technology

- Determine the impact of distributed systems and related internal controls on the auditor's study and evaluation of the system of internal control

- Identify computer auditing techniques related to distributed systems and minicomputers.

2. STUDY APPROACH

Our overall approach to accomplish these objectives appears in the task plan summarized in Exhibit I-1.

(1) Report Scope

This report presents the results of our efforts during the execution of Task 2 (Survey and Document Present System of Internal Control and Auditing Practices Related to Distributed Systems) and Task 3 (Research the Impact of Distributed Systems on Internal Control) of Part II (Conduct Field Work) of our technical approach.

- Survey and Document Present System of Internal Control and Auditing Practices Related to Distributed Systems

  The original purpose of this task was to familiarize ourselves with distributed systems and related internal controls within the Navy. However, our preliminary survey of internal controls and distributed systems in the Navy, indicated that there were no non-tactical distributed processing systems operational. As a result, a revision of our original task plan was required. Our initial task plan had called for the documentation of the present

I-1

Department of the Navy
Detailed Task Plan Schematic
Research on Internal Controls and Auditing

EXHIBIT I-1

Part I — Prepare Milestone Report | **Part II — Conduct Field Work** | **Part III — Prepare Final Report**

TASK 1
Initiate Project Efforts

- 1.1 Conduct Staffing Orientation Meetings
- 1.2 Establish Working Relationships and Define Channels of Communication

TASK 2
Obtain Survey Information

- 2.1 Examine Navy and DOD Regulations Applicable to the Design and Operations of the Navy's ADP Systems
- 2.2 Obtain Background Information on the Development and Implementation of Navy Distributed Systems
- 2.3 Collect Preliminary Information on Navy Audit Organization and Activities
- 2.4 Review General Auditing Policies

TASK 3
Refine Project Objectives and Update Work Plan

- 3.1 Refine Project Objectives
- 3.2 Identify Navy Installations to be Visited
- 3.3 Finalize Work Plan
- 3.4 Review Work Plan with the Navy

Milestone Report

TASK 1
Initiate Field Work

- 1.1 Prepare for Site Visit
- 1.2 Conduct Entrance Conference

TASK 2
Survey and Document Present System of Internal Control and Auditing Practices Related to Distributed Systems

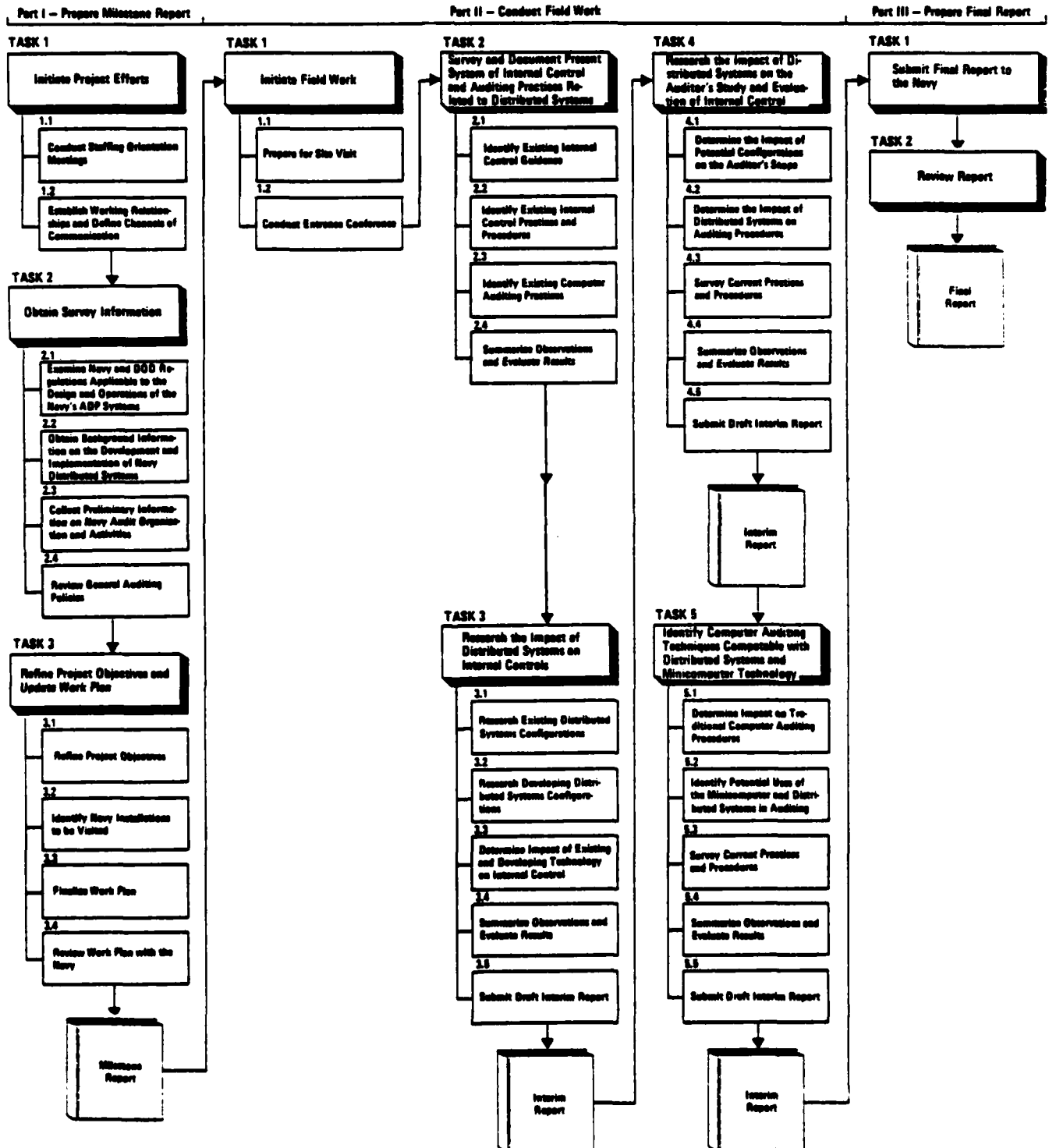- 2.1 Identify Existing Internal Control Guidance
- 2.2 Identify Existing Internal Control Practices and Procedures
- 2.3 Identify Existing Computer Auditing Practices
- 2.4 Summarize Observations and Evaluate Results

TASK 3
Research the Impact of Distributed Systems on Internal Controls

- 3.1 Research Existing Distributed Systems Configurations
- 3.2 Research Developing Distributed Systems Configurations
- 3.3 Determine Impact of Existing and Developing Technology on Internal Control
- 3.4 Summarize Observations and Evaluate Results
- 3.5 Submit Draft Interim Report

Interim Report

TASK 4
Research the Impact of Distributed Systems on the Auditor's Study and Evaluation of Internal Control

- 4.1 Determine the Impact of Potential Configurations on the Auditor's Scope
- 4.2 Determine the Impact of Distributed Systems on Auditing Procedures
- 4.3 Survey Current Practices and Procedures
- 4.4 Summarize Observations and Evaluate Results
- 4.5 Submit Draft Interim Report

Interim Report

TASK 5
Identify Computer Auditing Techniques Compatible with Distributed Systems and Minicomputer Technology

- 5.1 Determine Impact on Traditional Computer Auditing Procedures
- 5.2 Identify Potential Uses of the Minicomputer and Distributed Systems in Auditing
- 5.3 Survey Current Practices and Procedures
- 5.4 Summarize Observations and Evaluate Results
- 5.5 Submit Draft Interim Report

Interim Report

TASK 1
Submit Final Report to the Navy

TASK 2
Review Report

Final Report

system of internal controls and audit practices related to distributed systems. Instead of documenting existing systems and practices, we revised our approach and performed a more detailed review of developing distributed processing systems and the Navy's ADP system development process. After gaining this required background, we developed a system review document and selected two Navy distributed systems currently under development for more in-depth review. The detailed results of our preliminary survey were presented in a prior report dated February, 1980.

• Research the Impact of Distributed Systems on Internal Control

The purpose of this task was to identify the salient characteristics of distributed systems and analyze these characteristics in light of traditional internal controls. The determination of the potential impact of distributed systems on Navy internal controls relied substantially on the information developed during Task 2 regarding the Navy's EDP environment and developing distributed systems.

(2) Study Methodology

During the conduct of Tasks 2 and 3 the following research techniques were employed:

• Briefings - We attended briefings at several Navy organizations with the primary objective of obtaining a

general understanding of the Navy's EDP environment and audit objectives.

• Interviews (Navy Personnel) - We conducted interviews with representatives of the following organizational units:

- Office of Naval Research

- Naval Audit Service

- Navy Comptroller

- Naval Data Automation Command

- Navy Regional Data Automation Command

- Selected Naval Data Processing Installations

The purpose of these interviews was to obtain the necessary organizational, systems, and internal control information to properly understand (and document) the Navy's EDP environment; internal control practices; computer audit capability and objectives; and developing distributed systems.

• Interviews (Non-Navy Personnel) - Research into distributed systems and related internal control was supported in part through interviews with the following:

- Arthur Young & Company's National Computer Auditing Coordinator

- Arthur Young & Company's Computer Auditors

- Members of selected AICPA committees and task forces

- Representatives of computer equipment manufacturers.

The purpose of these interviews was to supplement the written material research conducted during this effort and to ensure, to the extent possible, the currency of our research in a rapidly developing technological area.

. __Written Materials__ - We obtained and reviewed regulations, EDP standards, systems documentation, periodicals and other available documentation to support our research effort in both developing our understanding of the Navy's EDP environment and evaluating the impact of distributed systems on internal controls.

. __Other__ - During the course of the engagement, we developed and utilized questionnaires and review guides. The objectives of these documents were to guide our staff's data gathering efforts during Task 2 and to ensure the completeness and relevance of the documentation obtained regarding the Navy's EDP environment and developing distributed systems.

3. __VOLUME 2 - IMPACT OF DISTRIBUTED SYSTEMS ON INTERNAL CONTROLS__

The purpose of Volume 2 is to present the results of our research regarding the impact of the distributed system environment on internal controls (Task 3). The discussion in this volume addresses general EDP procedures (e.g.

environmental controls) which are concerned with overall organization, policies, procedures, and controls common to all EDP applications.

To develop the proper framework for analysis, this volume addresses two variables: 1) the characteristics of a distributed environment and 2) general and specific procedures normally associated with a good system of internal control. The definition of the distributed environment discusses, the possible distributed functions and processes of distributed processing systems, as well as common data distribution patterns and alternative communications networks.

The discussion on internal controls identifies traditional general internal controls (e.g. policies and procedures related to organization and administration, operations, and system development and maintenance). These two variables delineate the analysis framework and are defined in Chapter I of Volume 2.

This framework provides the basis for the analysis performed in Chapter II of Volume 2 where the potential characteristics of distributed systems are compared to commonly applied general internal control procedures. The analysis also describes the impact which specific distributed system characteristics are likely to have on general internal control procedures. Chapter II continues with a discussion of specific internal control procedures which are particularly suited to a distributed system environment and concludes with a discussion of the impact of distributed systems on audit procedures.

Finally, Chapter III summarizes our major observations and recommendations related to the analysis described above. A summary of our observations is presented below:

- Distributed Systems Do Not have an Impact on the Basic Objectives of Internal Control

- Effective Control over the EDP Function is More Difficult in a Distributed System Environment

- Total System Coordination is Essential in a Distributed System Environment

- Internal Controls in a Distributed System Environment are Heavily Dependent on the System's Design

- The Characteristics and Requirements of Specific Applications have a Direct Impact on the System of Internal Control

- Personnel and Staffing Considerations Significantly Affect the Development of Internal Controls in a Distributed System Environment

- The Risk of Unauthorized Data Access and Manipulation is Significantly Increased in a Distributed Environment

- Distribution Systems often provide Internal Control Procedure Alternatives in the area of Contingencies and System Failure

- Specific Characteristics of Distributed Systems may be used to Strengthen Internal Controls

- The Internal Audit Function is Significantly Affected by the Characteristics of Distributed Systems.

Based on the analysis performed in Chapters I and II, we developed the following preliminary recommendations:

- Computer Systems and EDP Internal Control Training Should be required for All Auditors

- The Design of Distributed Systems Should Place Added Emphasis on Internal Control Considerations

- Standards and Procedures Should Be Developed to Ensure Adequate System-Wide Controls over Distributed Processes, Related Data Bases and the Network Configuration

- System Design Priority Should Be Given to Controls over the Operating System as a Key Element in the Overall Control of Distributed Systems

- The Development and Implementation of Distributed Systems Will Require More User-Oriented Documentation

- Emphasis Should be Placed on the Training of all Personnel Involved in the EDP Function

- Operating Controls Should Be Cognizant of the System's Total Coordination Requirements

- Procedures should be Developed to Ensure the System-Wide Consistency of Duplicated Data Bases

- Staffing Decisions and Specific Personnel Assignments Should Consider the Related Impact of these Decisions on Internal Controls

- Decisions to Self-Insure Against Catastrophe and Contingency Plans Should Be Centrally Determined and Properly Documented.

A more detailed discussion of our observations and recommendations appears in Volume 2 of this report.

4. VOLUME 3 -- NAVY ADP ENVIRONMENT

Volume 3 presents the results of our efforts related to Task 2, (Part II) of our project task plan. This task was designed to enable our project team to develop an understanding of the Navy's existing and developing ADP internal controls and the current practices of the Naval Audit Service. This knowledge was needed to guide our research efforts and provide a basis from which recommendations suitable to the Navy internal control environment could be made.

This section provides a concise explanation of the contents of Volume 3 and our objective in reviewing each research area. The remainder of this section discusses each chapter and the appendices contained in Volume 3 of our report.

- **Naval Audit Service**

  In conducting our reserch it was important to understand the organization that will ultimately use the results of our research efforts. This knowledge was necessary to develop recommendations tailored to the needs of the Navy and which are realistic within the Navy's operating environment. We obtained information on the Audit Service, its organization and activities, met with various members of the Audit Service and reviewed pertinent documentation.

- **NAVDAC and the ADP System Development Process**

  Another area of understanding which was required to conduct our research was knowledge concerning the Navy's System Development process. Our objective was to gain insight into the system development guidelines, practices and procedures followed in the Navy. In order to develop this knowledge, we met with various members of the Naval Data Automation Command (NAVDAC), reviewed pertinent documentation, and developed a chronology of the AIS Development and Approval process within the Navy.

- **The NARDAC Operating Environment**

  Controls which operate in computer centers are needed to complement other internal controls related to individual applications as well as controls over the system development process. The NARDAC organization was selected as representative of the Navy's ADP operating environment. Our purpose was to understand the policy, procedures, and organization used in the Navy to control data processing center operations. Our intention was not to review NARDAC operations in detail, but to understand the organizational structure, security environment, and other internal controls related to the NARDAC operating environment.

- <u>Systems Surveys</u>

Finally, we were interested in identifying the types of advanced systems the Navy is developing. Since no non-tactical distributed systems were operating in the Navy when our project began, we conducted a survey of systems currently under development. The objective of this task was to identify systems under development which had characteristics that were compatible with our analysis of advanced systems.

- <u>Systems Descriptions</u>

After completing our system surveys, we selected IDA/FMS and PASS Phase II/SDS for more in-depth reviews. Our objective was to understand the control features of these systems and to document the flow of data through these two systems. This system knowledge gave our project team a sound basis for evaluating the types of controls which would be most effective in the application systems the Navy was developing. We met with members of design agencies, project management personnel, and reviewed system documentation in developing our understanding of these systems.

- <u>Observations and Conclusions</u>

Below we present an overview of key observations and conclusions we have made during the conduct of this task and discuss items which impact the internal control environment in the Navy.

Further discussion of the items listed below are contained in Volume 3 of this report.

- The Navy's System Development Process Provides a Well-Controlled, Manageable Procedure for Developing ADP Systems

- NAVDAC's Initiatives in the Area of the ADP Security Manual and the ADP Inspection Guide are Positive Steps towards a Well-Controlled ADP Operating Environment

- The Standard NARDAC Organization Provides a Well-Controlled Operating Environment

- The Institution of a Test and Acceptance Group and the Levels of Service Concept Will Define Responsibilities in the ADP System Areas and Permit Operating Standards to be Enforced

- The Risk Assessment Should Provide Increased Awareness in ADP Security and Lead to a More Controlled Environment

- Due to the Nature of the Navy Environment, these Should Be Guidance Related to Internal Controls Available to System Design Agencies

- The Navy ADP System Development Process Should Be Supported by Increased Audit Service Involvement in the System Development Process

- The Audit Service Should Write the Section on the Naval Audit Service for the ADP Security Manual.

Based on our analysis of the Navy EDP internal control environment, and the observations listed above, we have rendered the following conclusions:

- Developing Navy Systems Will Change the Nature of Traditional Audit Approaches

- There is a Greater Need for Audit Involvement in the System Development Process

- Continuing Project Efforts will Emphasize the Impact of Distributed Systems on the Navy's Developing EDP Environment and How the Audit Service Can Best Serve the Navy in This Situation.

5.   PROJECT PLANS

In this section we present our plans for completion of Part II (Conduct Field Work) of our research project. We have concentrated our efforts on distributed systems and internal controls in the tasks just completed. In the following tasks we will focus on the auditor's study and evaluation of internal controls and evaluate the compatibility of computer audit techniques with distributed systems and minicomputer technology. The analysis of distributed systems and the understanding of the Navy's ADP environment developed to date will enhance our efforts and provide a sound basis to conduct future research. The presentation of our plans has been divided into two sections: Task 4 (Research the Impact of

Distributed Systems on the Auditor's Study and Evaluation of Internal Control) and Task 5 (Identify Computer Auditing Techniques Compatible with Distributed Systems and Minicomputer Technology). A discussion of each is presented below:

(1)   Task 4 – Research the Impact of Distributed Systems on the Auditor's Study and Evaluation of Internal Control

The subtasks associated with this task, as presented in Exhibit I-1, require the analysis of the impact of distributed system configurations on the auditor's scope and the auditing procedures to be utilized in this environment. We will continue to utilize the resources of Arthur Young & Company in performing this analysis. We have identified auditors within our firm who have experienced the growth of distributed systems and will evaluate their views in light of the Navy's ADP environment. We have also developed a working relationship with Arthur Young & Company's National Computer Auditing Coordinator. We feel his experience with a number of clients who have been confronted with these advanced systems will benefit our analysis. We will supplement this basis with audit expertise from the audit profession and the computer industry as needed. Our approach will remain flexible and react to situations which may develop during our research. This professional expertise will be complemented with an expanded understanding of the Naval Audit Service, its practices and current procedures. We have briefly discussed, with several members of the Audit Service, the computer audit practices and procedures currently utilized. This general understanding will be further developed to gain additional insight into the Audit

Service and to develop
recommendations suitable to the
Navy. This knowledge will also
benefit our Task 5 effort discussed
below.

(2) <u>Task 5 – Identify Computer
Auditing Techniques
Compatible with Distributed
Systems and Minicomputer
Technology</u>

This task is designed to
evaluate computer audit techniques
in light of advanced EDP technology.
We will again call on computer
auditors within Arthur Young &
Company to assist in the analysis
of various alternatives. Our task
plan, presented in Exhibit I-1,
identifies the subtasks associated
with this effort. We will also
evaluate the applicability of
minicomputer technology in
performing audit related functions.
Upon completion of this task our
field work will be completed.